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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/716,415	11/20/2003	Mihri Ozkan	034044.028	5544
53498	7590	08/16/2005	EXAMINER	
SMITH, GAMBRELL & RUSSELL, LLP (UC)			KEANEY, ELIZABETH MARIE	
SUZANNAH K. SUNDBY				
1850 M. STREET NW			ART UNIT	
# 800			2882	
WASHINGTON, DC 20036			PAPER NUMBER	

DATE MAILED: 08/16/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/716,415

Applicant(s)

OZKAN ET AL.

Examiner

Elizabeth Keaney

Art Unit

2882

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 November 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-29 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-29 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 20 November 2003 and 3 April 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: _____.

DETAILED ACTION

Oath/Declaration

The oath or declaration is defective. A new oath or declaration in compliance with 37 CFR 1.67(a) identifying this application by application number and filing date is required. See MPEP §§ 602.01 and 602.02.

The oath or declaration is defective because while it appears that an attempt was made to submit the entire document, only page 2 is of record. A full replacement Oath is required.

Claim Objections

Claims 1 and 3 are objected to because of the following informalities:

- Claim 1: It is unclear to the Examiner the desired meaning of the limitation "a first polymer layer and a second polymer layer or an organic molecule layer". For the purposes of examination the Examiner has interpreted the limitation to mean the quantum dot layer is between either a first polymer layer and a second polymer layer or between a first polymer layer and an organic molecule layer.
- Claim 3, line 1: The limitation "the aqueous solution" lacks antecedent basis, thus it appears that "claim 1" should be --claim 2--.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 11 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 11 recites the limitation "the second organic layer" in lines 1-2. There is insufficient antecedent basis for this limitation in the claim. For the purpose of examination, the Examiner has interpreted this limitation to be "the second polymer layer".

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical

Art Unit: 2882

Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000.

Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

Claims 1-3,5-10,12,16,17-21 and 23-26 are rejected under 35 U.S.C. 102(e) as being anticipated by Jain et al. (US Patent 6,797,412; hereinafter Jain).

Re claim 1: Jain discloses, in figure 10(a) and throughout the disclosure, a multilayer polymer-quantum dot light emitting diode comprising:

- at least one quantum dot layer (63) between a first polymer/organic layer (62) and a second polymer layer (64).

Re claims 2 and 3: The Examiner notes that the limitations “formed using...dots” and “aqueous suspension...stable” is drawn to product by process limitations. While the Examiner has addressed the implied structure produced by the process, a layer of quantum dots (63), the process limitation is afforded no patentable weight.

Re claim 5: Jain discloses at least one of the polymer layers comprising a low molecular weight compound selected from the group consisting of polyaromatics and polyheteroaromatics (column 6, line 46).

Re claim 6: Jain discloses at least one of the polymer layers comprises a high molecular weight compound selected from the group consisting of non-conjugated polymers and conjugated polymers (column 6, lines 46-47).

Re claim 7: Jain discloses the first polymer layer comprising a hole conducting polymer (column 6, lines 40-41).

Re claim 8: Jain discloses the second polymer layer comprising an electron conducting polymer (column 6, lines 42-43).

Re claim 9: Jain discloses the organic molecule layer comprises electron conducting organic molecule (column 6, lines 42-43).

Re claim 10: Jain discloses the first polymer layer comprises PVK (column 5, line 65).

Re claim 12: Jain discloses the quantum dots comprising a first element selected from Group 2 and 12 of the periodic table and a second element selected from Group 16 (column 5, lines 2-3).

Re claim 16: Jain discloses the quantum dots comprising a ZnS capped CdSe quantum dot (column 5, line 3).

Art Unit: 2882

Re claim 17: The Examiner notes that the limitation "deposited by spin coating" is drawn to a product by process limitation. While the Examiner has addressed the implied structure produced by the process, the second polymer layer, the process limitation is afforded no patentable weight.

Re claim 18: Jain discloses, in figures 3 and 4, the quantum dot layers (18,21,22,23) are alternating layers of quantum dots that are soluble in aqueous solvents or organic solvents.

Re claim 19: Jain discloses, in figure 4 and throughout the disclosure, at least one of the quantum dot layers (22) is deposited on top of a second polymer layer (24).

Re claim 20: Jain discloses, in figure 4 and throughout the disclosure, a multilayer polymer quantum dot light emitting diode which comprises alternating layers of quantum dot layers (21,22,23) and polymer layers (14,24,25), wherein the quantum dot layers are soluble in aqueous solvents and the polymer layers are soluble in organic solvents.

Re claim 21: Jain discloses one of the quantum dot layers comprising quantum dots that are the same or different from quantum dots in another quantum dot layer (column 5, line 3).

Art Unit: 2882

Re claims 23-25: The Examiner notes that the limitations of “a method of making a multilayer polymer-quantum dot light emitting diode” is drawn to a product by process limitation. While the Examiner has addressed the implied structure produced by the process, the multilayer polymer-quantum dot light emitting diode, the process limitations are afforded no patentable weight.

Re claim 26: Jain discloses a device (column 1, line 9) which comprises the multilayer polymer-quantum dot light emitting diode.

Claims 1-3,5,6,12,13,16,17 and 23-26 are rejected under 35 U.S.C. 102(e) as being anticipated by Miller et al. (US Patent 6,803,719; hereinafter Miller).

Re claim 1: Miller discloses, in figure 1 and throughout the disclosure, a multilayer polymer quantum dot light emitting diode comprising:

- at least one quantum dot layer (16) between a first polymer layer (11; column 6, line 38) and a second polymer layer (12; column 4, lines 59-65).

Re claims 2 and 3: The Examiner notes that the limitations “formed using...dots” and “aqueous suspension...stable” is drawn to product by process limitations. While the Examiner has addressed the implied structure produced by the process, a layer of quantum dots (16), the process limitation is afforded no patentable weight.

Re claim 5: Miller discloses at least one of the polymer layers comprising a low molecular weight compound selected from the group consisting of polyaromatics and polyheteroaromatics (column 4, lines 59-61).

Re claim 6: Miller discloses at least one of the polymer layers comprises a high molecular weight compound selected from the group consisting of non-conjugated polymers and conjugated polymers (column 4, lines 59-65).

Re claim 12: Miller discloses the quantum dots comprising a first element selected from Groups 2 and 12 of the periodic table of elements (column 4, lines 52-53) and a second element selected from Group 16 (column 4, lines 55-58).

Re claim 13: Miller discloses the quantum dots comprising a first element selected from Group 13 (column 4, lines 52-53) and a second element selected from Group 15 (column 4, lines 55-58).

Re claim 16: Miller discloses the quantum dots comprising ZnS (column 4, line 52) capped CdSe (column 4, line 56) quantum dots.

Re claim 17: The Examiner notes that the limitation "deposited by spin coating" is drawn to a product by process limitation. While the Examiner has addressed the

Art Unit: 2882

implied structure produced by the process, the second polymer layer, the process limitation is afforded no patentable weight.

Re claims 23-25: The Examiner notes that the limitations of "a method of making a multilayer polymer-quantum dot light emitting diode" is drawn to a product by process limitation. While the Examiner has addressed the implied structure produced by the process, the multilayer polymer-quantum dot light emitting diode, the process limitations are afforded no patentable weight.

Re claim 26: Miller discloses a device (column 1, line 25) which comprises the multilayer polymer-quantum dot light emitting diode.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 4 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jain as applied to claim 1 above, and further in view of Coombs et al. (US Patent 6,572,784; hereinafter Coombs).

Jain teaches the above limitations as shown above.

Art Unit: 2882

However, Jain fails to teach or fairly suggest that the quantum dots are hydrophilic.

Coombs discloses the use of quantum dots that are hydrophilic (column 11, line 51).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the quantum dot of Coombs for that of Jain because it allows the quantum dot to remain in a solution for an extended period of time thereby allowing the manufacturing of the device to be at a desired time, rather than instantaneously after the mixing of the solution (Coombs; column 11, lines 52-57).

Claims 4 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miller as applied to claim 1 above, and further in view of Coombs.

ObMiller teaches the above limitations as shown above.

However, Miller fails to teach or fairly suggest that the quantum dots are hydrophilic.

Coombs discloses the use of quantum dots that are hydrophilic (column 11, line 51).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the quantum dot of Coombs for that of Miller because it allows the quantum dot to remain in a solution for an extended period of time thereby

Art Unit: 2882

allowing the manufacturing of the device to be at a desired time, rather than instantaneously after the mixing of the solution (Coombs; column 11, lines 52-57).

Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Jain as applied to claim 1 above, and further in view of Matsuo et al. (US Patent 6,391,482; hereinafter Matsuo).

Jain teaches all the limitations as shown above, including the second polymer layer comprising an electron conducting polymer.

However, Jain fails to teach or fairly suggest the electron conducting polymer comprising tu-PBD.

Matsuo discloses the use of tu-PBD as an electron conducting layer (column 1, line 50-53).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the material of Matsuo for that of Jain because the choice of materials used for the electron conducting layer is considered to constitute an obvious matter of design based on the availabilities and cost of the materials.

Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Miller as applied to claim 1 above, and further in view of Matsuo.

Miller teaches all the limitations as shown above, including the second polymer layer comprising an electron conducting polymer.

Art Unit: 2882

However, Miller fails to teach or fairly suggest the electron conducting polymer comprising tu-PBD.

Matsuo discloses the use of tu-PBD as an electron conducting layer (column 1, line 50-53).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the material of Matsuo for that of Miller because the choice of materials used for the electron conducting layer is considered to constitute an obvious matter of design based on the availabilities and cost of the materials.

Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Jain as applied to claim 1 above, and further in view of Bawendi et al. (US Patent 6,444,143; hereinafter Bawendi).

Jain teaches all the limitations as shown above.

However, Jain fails to teach or fairly suggest the quantum dot comprising a Group 14 element.

Bawendi discloses a quantum dot comprising a Group 14 element (column 6, lines 32-33).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the quantum dot of Bawendi for that of Jain because it is more water soluble thereby improving manufacturing of the device (Bawendi; column 6, lines 30-31).

Art Unit: 2882

Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Miller as applied to claim 1 above, and further in view of Bawendi.

Miller teaches all the limitations as shown above.

However, Miller fails to teach or fairly suggest the quantum dot comprising a Group 14 element.

Bawendi discloses a quantum dot comprising a Group 14 element (column 6, lines 32-33).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the quantum dot of Bawendi for that of Miller because it is more water soluble thereby improving manufacturing of the device (Bawendi; column 6, lines 30-31).

Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Jain as applied to claim 1 above, and further in view of Matsuo.

Jain teaches all the limitations as shown above, including the second polymer layer comprising an electron conducting polymer.

However, Jain fails to teach or fairly suggest the electron conducting polymer comprising tu-PBD.

Art Unit: 2882

Matsuo discloses the use of tu-PBD as an electron conducting layer (column 1, line 50-53).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the material of Matsuo for that of Jain or Miller because the choice of materials used for the electron conducting layer is considered to constitute an obvious matter of design based on the availabilities and cost of the materials.

The Examiner notes that the limitation "deposited...by spin coating" is drawn to a product by process limitation. While the Examiner has addressed the implied structure produced by the process, the second polymer layer, the process limitation is afforded no patentable weight.

Claims 27-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jain as applied to claim 1 above, and further in view of Dumbrow et al. (US Patent 6,475,364; hereinafter Dumbrow).

Jain teaches all of the limitations as shown above.

However, Jain fails to teach or fairly suggest a kit which comprises the multilayer polymer-quantum dot light emitting diode.

It is well known to package the device in a kit with instructions, as further evidenced by Dumbrow (column 17, lines 5-35).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to include the device disclosed by Jain within a kit having

Art Unit: 2882

instructions because it would easily convey the instruction of use or installation of the light emitting device in an understandable manner.

Claims 27-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miller as applied to claim 1 above, and further in view of Dumbrow.

Miller teaches all of the limitations as shown above.

However, Miller fails to teach or fairly suggest a kit which comprises the multilayer polymer-quantum dot light emitting diode.

It is well known to package the device in a kit with instructions, as further evidenced by Dumbrow (column 17, lines 5-35).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to include the device disclosed by Miller within a kit having instructions because it would easily convey the instruction of use or installation of the light emitting device in an understandable manner.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- US Patents 6,157,047 and 6,236,060 disclose the current state of the art.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Elizabeth Keaney whose telephone number is (571)272-


Art Unit: 2882

2489. The examiner can normally be reached on Monday, Tuesday, Thursday, Friday 7:30-6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ed Glick can be reached on (571)272-2490. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


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SUPERVISORY PATENT EXAMINER